

SPASSKIY, N.Ya.

Upper border of the Eifelian stage in the Urals determined
according to the fauna of tetraacorals. Zap.LGI 37 no.2:83-98
'60. (MIRA 15:7)

(Ural Mountains--Geology, Stratigraphic)

SPASSKIY, N.Ya.

Devonian tetracorals of the upper Amur Valley and eastern
Transbaikalia. Zap.LGI 37 no.2:99-107 '60. (MIRA 15:7)
(Amur Valley—Corals, Fossil) (Transbaikalia—Corals, Fossil)

SPASSKIY, N.Ya.

Devonian tetracorals of the southern Altai and adjacent territories.
Zap.IGI 37 no.2:108-131 '60. (MIRA 15:7)
(Altai Territory—Corals, Fossil)

SPASSKIY, N.Ya.

Correlating middle Devonian deposits of the Urals and the Altai
by their tetracoralline fauna. Trudy VNIIGRI no.154:78-83 '60.
(MIRA 13:9)

(Ural Mountains--Corals, Fossil)
(Altai Mountains--Corals, Fossil)
(Paleontology, Stratigraphic)

MASSKIY, N.Ya.

[Tetracoralla of the U.S.S.R.; textbook for correspondence students for raising the qualifications of foremen and engineers] Chetyrekhluchovye korally SSSR; uchebnoe posobie dlia zauchnykh grupp povysheniia kvalifikatsii rukovodiashechikh i inzhenerno-tekhnicheskikh rabotnikov. Leningrad, Leningr. gosnyi in-t, 1964. 46 p. (MIRA 16:11)

DUBATOLOV, V.N.; SPASSKIY, N.Ya.; SOKOLOV, B.S., otv. red.; ROZANOV,
A.Yu., red.

[Stratigraphic and geographic outline of Devonian corals
in the U.S.S.R.] Stratigraficheskii i geograficheskii ob-
zor devonskikh korallov SSSR. Moskva, Izd-vo "Nauka,"
1964. 139 p. (MIRA 17:6)

1. Chlen-korrespondent AN SSSR (for Sokolov).

SPASSKIY, O.V.

Use of dopan and myelosan in the treatment of chronic myelo-
leukemia. Sovet. med. 26 no.5:30-33 My'63 (MIRA 17:1)

1. Iz kliniki gospiatal'noy terapii (zav. - doktor med. nauk
P.N.Yurenev) Pediatricheskogo fakul'teta II Moskovskogo me-
ditsinskogo instituta imeni Pirogova.

SPASSKIY, O.V.

Compound treatment of chronic myeloid leukemia. Sov. med. 27
no.12:9-14 D'63 (MIRA 17:4)

1. Iz kliniki gosspital'noy terapii (zav. - doktor med. nauk
P.N.Yurenev, nauchnyy rukovoditel' - dotsent Ye.V.Kasatkin)
pediatricheskogo fakul'teta II Moskovskogo meditsinskogo insti-
tuta imeni Pirogova.

SPASSKIY, R. A.

"On the Asymptotic Stability of Several Regulated Systems With A Characteristic Equation Having Several Null Roots." Cand Phys-Math Sci, Leningrad State Pedagogical Inst, Leningrad, 1954. (RZhMat, Jan 55)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (12)
SO: Sum. No. 556, 24 Jun 55

SPASSKIY, R. A.

FD-639

USSR/Mathematics - Automatic regulation systems

Card 1/1 : Pub. 85 - 6/12

Author : Spasskiy, R. A. (Leningrad)

Title : A class of regulated systems

Periodical : Prikl. mat. i mekh., 18, 329-344, May/Jun 1954

Abstract : Treats one of the critical cases of stability of motion that are encountered in certain systems of automatic regulation. In order to construct the Lyapunov function the author starts with the results in A. I. Lur'ye's book Nekotoryye nelineynyye zadachi teorii avtomaticheskogo regulirovaniya [Certain nonlinear problems of the theory of automatic regulation], GTTI, 1951. Also utilizes the works of I. G. Malkin, N. P. Yegugin, and A. M. Letov, all in PMM, 1950-1953.

Institution : --

Submitted : January 25, 1954

SPASSKIY, R. A.

Transformation of equations related to automatic control
systems. Uch. zap. Ped. inst. Gerts. 125:217-231 '56.

(MLRA 9:12)

(Automatic control) (Differential equations)

SOV/124/58-8-8408

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 8, p 10 (USSR)

AUTHOR: Spasskiy, R.A.

TITLE: A Special Type of Control Systems (Osobyi vid reguliruyemykh sistem)

PERIODICAL: Uch. zap. Vyborsk. gos. ped. in-t, 1957, Vol 2, pp 3-14

ABSTRACT: A generalized examination is made of a nonlinear control system in which the characteristic equation of the "linear portion" contains an arbitrary multiple of the zero root. The system is reduced to the canonical form. The conditions of the uniqueness of the position of equilibrium are determined. To investigate the system's stability, the author sets up a Lyapunov function. What is distinctive about the investigation is the fact that a finite region of the phase space is divided into two portions, in one of which the derivative of the Lyapunov function equals zero, while in the other part it is positive. A general method is given for determining the conditions sufficient for asymptotic stability in the case of a control system of this special type.

Card 1/1

Ye. P. Popov

39020

S/140/62/000/004/009/009
C111/C333

16.8000

AUTHOR: Spasskiy, R. A.

TITLE: On a control system with auxiliary energy

PERIODICAL: Vysshiye uchebnyye zavedeniya. Izvestiya. Matematika,
no. 4, 1962, 146-151

TEXT: Considered is the system

$$\dot{x}_i = \sum_{j=1}^N b_{ij} x_j + \sum_{s=1}^m n_{si} \xi_s, \quad \xi_s = f_s(\xi_s), \quad \xi_s = \sum_{j=1}^N p_{sj} x_j - \sum_{\beta=1}^m r_{s\beta} \xi_{\beta} \quad (1)$$

(i = 1, ..., N; s = 1, ..., m)

where $f_s(\xi_s)$ are continuous, satisfying

$$\xi_s f_s(\xi_s) > 0, \quad f_s(0) = 0. \quad (2)$$

One supposes that the characteristic equation $\det \| b_{ij} - f_{ij} \lambda \| = 0$ possesses k single zeros and n = N-k different roots λ_i with negative

Card 1/2

On a control system with auxiliary ... S/140/62/000/004/009/009
C111/C333
real parts. After the transformation $\dot{x}_i = \sum_{j=1}^N \alpha_{ij} z_j$ to the canonic
form of A. I. Lur'ye and after the construction of the Lyapunov func-
tion

$$V = \sum_{i=1}^n F_i - \frac{1}{2} \sum_{\alpha=n+1}^N A_{\alpha} z_{\alpha}^2 - \sum_{s=1}^m B_s \int_0^{\sigma_s} f_s(\epsilon_s) d\epsilon_s \quad (2.1)$$

where $A_{\alpha} > 0$, $B_s > 0$ and

$F_i = \sum_{\alpha=1}^n \sum_{\beta=1}^n \frac{a_{i\alpha} a_{i\beta}}{\lambda_{\alpha} + \lambda_{\beta}} z_{\alpha} z_{\beta}$, one obtains sufficient conditions for
asymptotic and absolute stability.

ASSOCIATION: Pskovskiy pedagogicheskiy institut im. S.M.Kirova
(Pskov. Pedagogical Institute im. S.M. Kirov)

SUBMITTED: September 18, 1959

Card 2/2

SPASSKIY, S. [Spas'kyi, S.], kand.tekhn.nauk

Contribution of the Ural scientists to national economy. Nauka i
zhyttia 11 no.2:50-51 F '62. (MIRA 15:3)

1. Ispolnyayushchiy obyazannosti predsedatelya prezidiuma
Ural'skogo filiala AN SSSR.

(Ural Mountain region--Research)

SPASSKIY, S.A.

Spiders of the Turan zoogeographical region. Ent.oboz. 32:
192-305 '52. (MLRA 7:1)
(Turan Lowland--Spiders) (Spiders--Turan Lowland)

SPASSKIY, S.A.

Bite of the spider *Chiracanthium punctorium* Villers. Med.paraz.
i paraz.bol. 26 no.1:73-74 Ja-F '57. (MLRA 10:6)

1. Iz Novocherkasskogo inzhenerno-meliorativnogo instituta (dir.
N.K.Shul'ga).

(ARACHNIDISM, case rep.

Chiracanthium punctorium Villers)

SPASSKIY, S.A.

Dictyna uncinata Thor. (Aranei, Dictynidae); a biological study [with summary in English]. Zool. zhur. 37 no.7:1006-1011 J1 '58. (MIRA 11:8)

1. Novocherkassiy inzhenerno-meliorativnyy institut.
(Spiders)

Spasskiy, S. S. -- "Disinfection with Chlorine of Water infected with the Agents of Brucellosis." First Moscow Order of Lenin Medical Inst, Moscow, 1955 (Dissertation for Degree of Doctor of Medical Sciences.)

SO: Knizhnaya Letopis', No. 23, Moscow, Jun 55, pp87-104

LASKINA, V.P.; SPASSKIY, S.S.; FRIDLYAND, S.A.

Influence of the temperature of water on the effect of its
disinfection with chlorine. Trudy 1-go MMI 5:159-163 '59.
(MIRA 13:8)

1. Iz kafedry kommunal'noy gigiyeny (zav. - chlen-korrespondent
AMN SSSR prof. S.N. Cherkinskiy) 1-go Moskovskogo ordena
Lenina meditsinskogo instituta im. I.M. Sechenova.
(WATER—CHLORINATION) (WATER—BACTERIOLOGY)

SPASSKIY, S.S.

Comparative resistance to chlorine of the causative agents of
brucellosis and Escherichia coli. Trudy 1-go MMI 5:163-166
'59. (MIRA 13:8).

1. Iz kafedry kommunal'noy gigiyeny (zav. - chlen-korrespondent
AMN SSSR prof. S.N. Cherkinskiy) 1-go Moskovskogo ordena
Lenina meditsinskogo instituta im. I.M. Sechenova.
(BRUCELLA) (ESCHERICHIA COLI)
(CHLORINE--PHYSIOLOGICAL EFFECT)

SPASSKIY, S.S., assistant

Chlorine disinfection of water infected with brucellar pathogens.
Gig.i san. 26 no.1:107-109 Ja '61. (MIRA 14:6)

1. Iz kafedry kommunal'noy gigiyeny I Moskovskogo ordena Lenina
meditsinskogo instituta imeni I.M.Sechenova.
(WATER—CHLORINATION) (BRUCELLA)

KRASOVSKIY, G.N.; SPASSKIY, S.S.

Experimental basis for the permissible concentration of
polychloropinene in bodies of water. San.okhr.vod.ot zagr.prom.
stoch.vod no.5:167-186 '62. (MIRA 17 6)

1. Kafedra kommunal'noy gigiyeny I Moskovskogo ordena Lenina
meditsinskogo instituta imeni I.M.Sechenova.

SPASSKIY, S.S. (Moskva)

Scientific Session on the Work Results of the Hygienic Departments of the First Moscow Medical Institute. Gig. truda i prof. zab. 7 no.1:58 Ja'63 (MIRA 16:12)

SUVOROV, A.L.; SPASSKIY, S.S.

Interaction of alkylorthotitanates with dibasic acid anhydrides.
Dokl. AN SSSR 157 no.3:639-642 J1 '64. (MIRA 17:7)

1. Institut khimii Ural'skogo filiala AN SSSR. Predstavleno
akademikom A.N. Nesmeyanovym.

L 54553-65 EWT(m)/EPF(c)/EMP(j)/T Pc-4/Pr-4 RM UR/0286/65/000/009/0071/0071
 ACCESSION NR: AP5015312 678.766.7

AUTHOR: Suvorov, A. L.; Spasskiy, S. S.

TITLE: Preparation of organotitanium polymers or oligomers with unsaturated acyl groups. Class 39, No. 170686

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 9, 1965, 71

TOPIC TAGS: organotitanium polymer, organotitanium oligomer, unsaturated polymer

ABSTRACT: An Author Certificate has been issued for a preparative method for organotitanium polymers or oligomers with unsaturated acyl groups. The method involves treatment of organotitanium polymers or oligomers containing alkoxy substituents at the Ti atom with anhydrides of unsaturated mono- or di-basic acids.

[EO]

ASSOCIATION: none

SUBMITTED: 13Mar64

ENCL: 00

SUB CODE: Oc, Gc

NO REF SOV: 000

OTHER: 000

ATD PRESS: 4329

Card 1/19

L 52129-65 EPF(c)/EWP(j)/EWT(m) Pc-4/Pr-4 RM

ACCESSION NR: AP5015291

UR/0286/65/000/009/0067/0067

AUTHORS: Kodolov, V. I.; Spasskiy, S. S.

TITLE: A method for obtaining phosphorus-bearing polyesters. Class 39, No. 170663

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 9, 1965, 67

TOPIC TAGS: polyester, phosphorus, dihydroxy compound, bond, methacrylic acid

ABSTRACT: This Author Certificate presents a method for obtaining phosphorus-bearing polyesters by the polycondensation of dichloranhydride of phosphorus acids with dihydroxy compounds. To obtain phosphorus-bearing polyesters with double bonds at the ends of the chain, and also to broaden the assortment of unsaturated phosphorus-bearing polyesters, chloranhydride of an unsaturated acid, such as methacrylic acid, is introduced into the reacting mixture.

ASSOCIATION: none

SUBMITTED: 16Mar64

ENCL: 00

SUB CODE: 00

NO REF SCV: 000

OTHER: 000

Card 1/1 *Trif*

SEMERNEVA, G.A.; SUVOROV, A.L. SAMARINA, L.A.; ALEKSEYEVA, I.A.; SPASSKIY, S.S.

Infrared spectra of some organotitanium compounds. Zhur. prikl.
spekt. 3 no. 6:555-559 D '65 (MIRA 19:1)

1. Submitted October 8, 1964.

SPASSKIY, S.S.

Chemical Abst.
Vol. 48 No. 6
Mar. 25, 1954
Organic Chemistry

Structure of polyamide of diphenic acid. S. S. Spasskiy and M. A. Mikhailova. *Zhur. Obshch. Khim.* 23, 507-8 (1953).—The polyamide of diphenic acid and $H_2N(CH_2)_6NH_2$ obtained by refluxing 2 hrs. at 220° then heating 4 hrs. without a reflux condenser and 2 hrs. at 10-15 mm. under a N atm., is a yellowish solid, m. 170-6°. Examined by x-ray diffraction shows that the product is amorphous, this state being apparently caused by the disposition of the carboxyl groups, which prevent orientation of the chains.

(S. M. Kozlovoff)

SPASSKIY, J.J.

USSR

✓ Structure of polyamides of diphenic acid. S. S. Spasskiy
and M. A. Mikhaylova. J. Gen. Chem. U.S.S.R. 23, 625-6
(1953) (Engl. translation). See C.A. 48, 3311d. H. L. H.

200-111111
YEFIMOV, A.N., doktor ekonomicheskikh nauk, redaktor; SPASSKIY, S.S.,
kandidat tekhnicheskikh nauk, redaktor; GANBAR, M.I., inzhener,
redaktor; KUDASHEV, A.I., redaktor; MEVRAYEVA, N.A., tekhnicheskiy redaktor

[Plastics in machine building; collection of papers of the Ural
conference on plastics] Plasticheskie massy v mashinostroenii;
sbornik trudov Ural'skogo soveshchaniya po plastmassam. Moskva,
Izd-vo Akademii nauk SSSR, 1955. 249 p. (MLBA 8:10)

1. Akademiya nauk SSSR. Ural'skiy filial, Sverdlovsk.
(Plastics) (Machinery-Design)

SPASSKIY, S.S.

Chem ✓ Contact oxidation of technical phenanthrene with atmospheric oxygen. S. S. Spasskiy, M. A. Mikhailova, A. V. Tokarev, and A. I. Tarasov. *Zhur. Priklad. Khim.* 29, 447-53 (1956).—A detailed description of construction of a flow app. for large lab. scale oxidation of phenanthrene by air blowing at 400-550° is given. The best catalyst was molten V_2O_5 . The best yields of total acidic products (phthalic anhydride, maleic anhydride, and anthraquinone were followed) recd. on phthalic anhydride were: 82.5% from 70% phenanthrene, and 73.7% from 90% phenanthrene. V_2O_5 on Al_2O_3 and Sn or Ti vanadates gave inferior results as did the NH_4 salt of phosphovanadotungstic heteroacid.

G. M. Keselapoff

PM

SPASSKIY, S. S.

Check Contact oxidation of technical phenanthrene with at-
mospheric oxygen. S. S. Spasskiy, M. A. Mikhailov, A. V.
Tcharey, and A. I. Tarasov. J. Appl. Chem. U.S.S.R. 29,
485-48 (1956) (Engl. translation).—See C.A. 50, 13953a.
B.M.P.

5.3830

Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 24, p 643 (USSR)

68949
SOV/81-59-24-88951

AUTHORS: Tokarev, A.V., Spasskiy, S.S.

TITLE: An Investigation of the Copolymers of Poly-1,3-Butyleneglycolfumarate and Styrene

PERIODICAL: Tr. In-ta metallurgii, Ural'skiy fil. AS USSR, 1958, Nr 4, pp 127 - 132

ABSTRACT: Diagrams plotted of the integral and differential composition of the copolymers show that in the case of the initial ratios of the monomers, which differ from azeotropic ratios, the reaction mixture is enriched in styrene. The dependence between the structure of copolymers and their mechanical properties was studied by means of Kargin's method based on the plotting of thermomechanical curves, on which the polystyrene regions can be detected. The samples for the test were prepared by block polymerization in an N₂ atmosphere in the presence of benzoyl peroxide at 70°C and various initial ratios of the components. Together with the trimer also linear polystyrene chains are contained in the copolymer; at the same time also copolymers are formed which are relatively homogeneous in their composition.

Card 1/2

68949

SOV/81-59-24-88951

An Investigation of the Copolymers of Poly-1,3-Butyleneglycolfumarate and Styrene

With an increase in the styrene content in the initial mixture the mechanical resistance of the copolymer (impact and bending resistance) deteriorates. The copolymers are solid, transparent, almost colorless, substances which are insoluble in any of the usual solvents. The study of the physical-mechanical and electrical properties showed that the new substance can be used as electric insulation material.¹²

N. Motovilova

4

Card 2/2

SPASSKIY, S.S.

Individual quantitative characteristics of the activities of unsaturated compounds in copolymerization reactions. Trudy Inst. khim.
UFAN SSSR no.3:5-20. '59. (MIRA 14:3)
(Unsaturated compounds) (Polymerization)

SPASSKIY, S.S.; TOKAREV, A.V.; MIKHAYLOVA, M.A.; TARASOV, A.I.; MOLCHANOVA, T. V.;
MAT'KOVA, M. Ye.

Copolymerization of unsaturated polyesters with vinyl monomers. Trudy
Inst. khim. UFAN SSSR no.3:21-32 '59 (MIRA 14:3)
(Esters) (Vinyl compounds) (Polymerization)

SPASSKIY, S.S.; OBOLONSKAYA, N.A.; YUGIN, V.I.; GINZBURG, S.B.; TAGIL'TSEVA,
Ye.S.

Plasticizers for nitrile rubbers based on polyester resins. Trudy
Inst. khim. UFAN SSSR no.3:33-42 '59. (MIRA 14:3)
(Plasticizers) (Rubber, Synthetic)

5.3700(B)

66910

~~5 (3)~~

AUTHORS: Suvorov, A. L., Spasskiy, S. S.

SOV/74-28-11-1/5

TITLE: Organic Titanium Compounds

PERIODICAL: Uspekhi khimii, 1959, Vol 28, Nr 11, pp 1267-1309 (USSR)

ABSTRACT: The chemistry of organic titanium compounds has been considerably developed in the last 10-15 years. In the present paper, an attempt was made to summarize and systematize the data available in this field. Substances containing titanium with at least 1 organic radical are dealt with more thoroughly. All organic titanium compounds may be divided into 3 groups: 1) Compounds containing titanium-carbon bonds (real organo-titanium compounds), including the bis-cyclopentadienyl compounds of titanium; 2) compounds in which the organic radical is combined with the titanium atom by elements such as oxygen, nitrogen et al (esters and amides of titanic acids, mixed anhydrides of titanic and carboxylic acids etc); and 3) coordination compounds of inorganic titanium compounds with organic molecules. In the present paper, mainly compounds of the largest, the second group, are dealt with, and the 1st group is mentioned briefly. Coordination compounds are not discussed. Methods of preparation, physical and chemical properties of

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SOV/74-28-11-1/5

Organic Titanium Compounds-

acid esters or dialkoxy-titanium oxides $(RO)_2TiO$ are substances little known (Refs 113, 123, 154, 187). Esters of the titanous acid or trialkoxy-titanium compounds $Ti(OR)_3$ are obtained on reduction of alkyl-ortho-titanium compounds with metallic sodium (Ref 79) or potassium (Ref 154) in alcohol. From among polymeric organic titanium compounds, the poly-titanium oxane compounds are best known which contain an inorganic chain of titanium and oxygen atoms surrounded by organic groups. So far, only a few hexaalkoxy-dititanium oxanes (Refs 187, 188) and octaalkoxy-trititanium oxanes (Refs 62, 187) have been isolated. Further, polyorganosiloxane-titanium oxanes are known which are polytitanium oxanes (I), and the chains of which are surrounded by trialkyl(aryl)-siloxyl groups; and also polyorganotitanium siloxanes (II) containing an inorganic chain of titanium, silicon and oxygen atoms surrounded by organic groups. Few data are available on polymers obtained by polymerization or copolymerization of some unsaturated organic titanium compounds (Refs 62, 76, 77, 88, 94, 95, 92, 118-120, 123, 113, 136, 137, 141-143, 151, 169, 171, 187-214). Organic titanium compounds

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Organic Titanium Compounds

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SOV/74-28-11-1/5

are not yet as widely used as e.g. organosilicon compounds. But the investigation of their applicability which is mainly described in patents indicates a considerable practical importance of these compounds. Ortho-titanic acid esters may thus be used for the production of heat-resisting coatings (Refs 83, 88, 89, 94, 118, 119, 121, 129, 136, 137, 200, 215-222) as cross-linking agents (Refs 141-143, 212, 223-241), as hydrophobic agents (Refs 77, 181, 201-204, 208, 242-249) and as catalysts in the polymerization and interchange of ester radicals (Refs 250-263). Various other possibilities of application have been described in references 77, 193, 203, 229, 236, 264-274. The following Soviet scientists are mentioned in this survey: G. P. Luchinskiy, V. M. Plets, A. N. Nesmeyanov, R. Kh. Freydlina, O. V. Nogina, G. A. Razuvayev, L. M. Bobinova, V. S. Etlis, A. B. Bruker, R. I. Frenkel', I. Z. Soborovskiy, E. M. Braynina, B. A. Arbuzov, T. G. Shavsha, N. F. Orlov, B. N. Dolgov, M. G. Voronkov, K. A. Andrianov, V. G. Dulova, T. N. Ganina, Yu. N. Andreyev, V. A. Nikol'skiy. There are 1 figure, 10 tables, and 274 references, 46 of which are Soviet.

Card 4/5

66910

SOV/74-28-11-1/5

Organic Titanium Compounds

ASSOCIATION: Ural'skiy filial AN SSSR (Ural Branch AS USSR). Institut
khimii, laboratoriya vysokomolekulyarnykh soyedineniy
(Chemical Institute, Laboratory of High-molecular Compounds)

Card 5/5

5(4)

AUTHORS:

TITLE:

Spasskiy, S. S., Tarasov, A.I, Tokarev, A.V. SOV/76-33-2-2/45
Copolymerization of Unsaturated Polyesters and Vinyl Monomers
(Sopolimerizatsiya nenasyschennykh poliefirov s vinilovymi
monomerami). I. Determination of the Number of Double Bonds
in Copolymers of Unsaturated Polyesters and Vinyl Monomers
(I. Opredeleniye chisla dvoynykh svyazey v sopolimerakh ne-
nasyschennykh poliefirov i vinilovykh monomerov)

PERIODICAL:

Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 2,
pp 249 - 254 (USSR)

ABSTRACT:

Although these copolymers represent new thermally reactive
synthetic materials the principles involved in their copoly-
merization have not been sufficiently investigated. The
possibilities of applying two methods, based on the additivity
of the specific volumes and of the specific refractions,
were investigated. The following systems were used in checking
the methods: polydiethylene glycol fumarate - acrylonitrile;
polydiethylene glycol fumarate (I) - styrene; (I)-methyl
methacrylate; (I)-vinyl acetate. Laboratory workers M. A.
Mikhaylova, T. V. Molchanova, M. K. Mat'kova participated
in the experiments. The copolymerization was carried out

Card 1/3

Copolymerization of Unsaturated Polyesters and Vinyl Monomers. I. Determination of the Number of Double Bonds in Copolymers of Unsaturated Polyesters and Vinyl Monomers SOV/76-33-2-2/45

in glass ampuls in the presence of 0.1% by weight benzoyl peroxide in a nitrogen atmosphere and at $60 \pm 0.5^\circ\text{C}$. The index of refraction was determined using an Abbe refractometer. The magnitude of the specific shrinking of the polyester chain was determined by proceeding upon the assumption (Ref 7) that the shrinkage of the monomers in the polymerization (contraction) is dependent upon their structures. The styrene-methyl methacrylate system was tested using the rule of the additivity of the specific volumes (Table 2). The contraction was determined from the specific volumes of the diethyl fumarate (II) and polydiethyl fumarate (III) using the equation $P = M(\delta_P - \delta_{PF})$ (P = contraction, M = molecular weight of (II), δ_P, δ_{PF} = specific volumes of (II) and (III)); the value found was 16.7. The specific shrinkage for the chain of (I) was found to be 0.08971. The determination of the increments of the monomer double bond was carried out using the specific refraction (Table 4); a value of 0.0144 was found for (I). The results obtained by both

Card 2/3

Copolymerization of Unsaturated Polyesters and Vinyl Monomers. I. Determination of the Number of Double Bonds in Copolymers of Unsaturated Polyesters and Vinyl Monomers SOV/76-33-2-2/45

methods described above (Table 5) are in good agreement, and it may be concluded from these determinations that both methods are equally valid in determining the copolymerization constants of unsaturated polyesters and vinyl derivatives. There are 5 tables and 8 references, 5 of which are Soviet.

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR, Sverdlovsk (Ural Branch of the Academy of Sciences, USSR, Sverdlovsk)

SUBMITTED: March 6, 1957

Card 3/3

5(4), 15(8)

AUTHORS:

Tokarev, A. V., Spasskiy, S. S.

SOV/76-33-3-8/41

TITLE:

Co-polymerization of Unsaturated Polyesters With Vinyl Monomers (Sopolimerizatsiya nenasyschennykh poliefirov s vinilovymi monomerami). II. Determination of the Co-polymerization Constants (II. Opredeleniye konstant sopolimerizatsii)

PERIODICAL:

Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 3, pp 554 - 558 (USSR)

ABSTRACT:

The example of the system poly-1,3-butyleneglycolfumarate-styrene (I) serves as proof of the possibility of applying the integral equation according to Mayo and Lewis to the determination of the constants of co-polymerization of unsaturated polyesters together with vinyl derivatives. Co-polymerization was carried out in glass ampoules in a nitrogen atmosphere in the ultrathermostat at $60 \pm 0.1^\circ\text{C}$ and 0.01% by weight of benzoyl peroxide. A comparison between the polystyrenes obtained and a product (Ref 7) described in publications is given (Table 1). With increasing reaction intensity in polymerization the styrene-content in the co-

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Co-polymerization of Unsaturated Polyesters With Vinyl Monomers. II. Determination of the Co-polymerization Constants SOV/76-33-3-8/41

polymer increases somewhat up to a certain extent (11-12% by weight). Two different experiments were carried out (Tables 3,4) in order to investigate the reactivity of the co-polymer; it was found that no soluble intermediate products form in this reaction. Only part of the double bonds of the polyester takes part in co-polymerization (Table 2), whereas the other part passes over into the co-polymer without any change, which fact has to be taken into account in connection with the calculation of the co-polymerization constants (CPC) by a corresponding correction. The calculation results of the (CPC) according to the equation by Mayo-Lewis, with the above correction, are in good agreement and are for (I) $r_1 = 3.0 \pm 0.4$ and $r_2 = 0.03 \pm 0.03$.

The values show that the radicals M_1^\bullet of the polyester do more rapidly react with its monomers than with styrene and that the styrene radical M_2^\bullet reacts predominantly with the unsaturated ester chains of the polyester, which is considered to be due to additional steric hindrances. In con-

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Co-polymerization of Unsaturated Polyesters With Vinyl Monomers. II. Determination of the Co-polymerization Constants SOV/76-33-3-8/41

clusion the authors thank V. V. Korshak. There are 5 tables, and 7 references, 2 of which are Soviet.

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR (Ural Branch of the Academy of Sciences, USSR)

SUBMITTED: March 6, 1957

Card 3/3

5 (4), 15 (8)

AUTHORS: Spasskiy, S. S., Mikhaylova, M. A., SOV/76-33-7-1/40
Tarasov, A. I., Molchanova, T. V.,
Mat'kova, M. Ye.

TITLE: Copolymerization of Unsaturated Polyesters With Vinyl Monomers.
IV. Copolymerization of Polydiethylene Glycol Fumarate With
Styrene, Acrylonitrile, Methyl Methacrylate, and Vinyl Acetate

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 7, pp 1449 - 1454
(USSR)

ABSTRACT: In a previous paper (Ref 1) it was found among other things
that acrylonitrile during copolymerization (C) with unsaturated
polyesters (PE) shows decreasing activity compared with that in
(C) with diesters of fumaric acid. It was assumed that these
phenomena are due to steric factors. In order to confirm this
assumption, the authors investigated the (C) of polydiethylene
glycol fumarate (I) with styrene (II), acrylonitrile (III),
methyl methacrylate (IV), and vinyl acetate. The properties of
the vinyl monomers are listed (Table 1). The (C) constants (CC)
were determined according to the Mayo-Lewis equation (Ref 4).
The experimental results obtained are listed (Table 2) from

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Copolymerization of Unsaturated Polyesters With Vinyl SOV/76-33-7-1/40
Monomers. IV. Copolymerization of Polydiethylene Glycol
Fumarate With Styrene, Acrylonitrile, Methyl Methacrylate, and Vinyl Acetate

which the (CC) as well as the reaction rate of the chain radicals of the (PE) and of the vinyl monomers were calculated (Table 3). The activity of the vinyl derivatives increases (with respect to the chain radical of the (PE)) from (II) to (V), while during the (C) of vinyl monomers an opposite phenomenon may be observed (Ref 5), i.e. (II) possesses the strongest and (V) the weakest activity. The experimental results obtained confirm the above effect of steric factors. It is assumed that the latter increases with increasing size of the radical at the double bond and with decreasing elasticity of the monomer molecule. The authors plotted diagrams of the integral composition of the systems under investigation (Figs 1 - 4); furthermore, they pointed out among other things that no azeotropic mixtures are formed by the systems (I) + (II) and (I) + (IV). The above diagrams permit determination of the conditions for preparing homogeneous copolymers. There are 4 figures, 3 tables, and 9 references, 7 of which are Soviet.

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Copolymerization of Unsaturated Polyesters With Vinyl SOV/76-33-7-1/40
Monomers. IV. Copolymerization of Polydiethylene Glycol
Fumarate With Styrene, Acrylonitrile, Methyl Methacrylate, and Vinyl Acetate

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR Sverdlovsk (Ural Branch of
the Academy of Sciences of the USSR, Sverdlovsk)

SUBMITTED: March 17, 1957

Card 3/3

5(3)

AUTHORS:

Suvorov, A. L., Spasskiy, S. S.

SOV/20-127-4-21/60

TITLE:

Copolymerization of Unsaturated Acyl Derivatives of Butyl Polytitanate With Styrene

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 4, pp 805-807 (USSR)

ABSTRACT:

Titanium-containing polymers, resulting from polymerization of unsaturated titanium-containing compounds or from copolymerization of the latter with vinyl monomers have not yet been thoroughly investigated. As may be seen from a short survey of publications (Refs 1-4), there are no data available on the synthesis and copolymerization of titanium-containing polymers, type (I)(Scheme) - of which a portion of organic groups is unsaturated - with vinyl monomers. The authors attempted to explain the possibility of such a synthesis. For this purpose, they made use of the case with which the alkoxy groups in acyl polytitanates can be replaced by acyl remainders. They obtained an unsaturated polycondensation product of type (I). By heating an alkyl polytitanate with a fatty acid, preferably one having a long chain, the acyl groups were substituted for the alkyl groups

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Copolymerization of Unsaturated Acyl Derivatives of
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in vacuum, accompanied by the separation of a corresponding alcohol (II). A similar reaction between butyl polytitanate and cinnamic or **furyl** acrylic acid in various ratios resulted in the formation of unsaturated acyl derivatives of type (II). According to the quantity of the acid introduced, the waxy or colophony-like substances were obtained. When heating with styrene, these compounds entered copolymerization at 100-150° in the presence of 1-2% of benzoyl peroxide so as to form transparent brown-red polymers. The latter are unsoluble in acetone, benzene, and toluene, but in the two last-mentioned solvents a swelling occurs. Contrary to butyl polytitanate and its acyl derivatives the above polymers are not affected by storing them in water for three months; They are further boil-fast and resist heating with aqueous acetone. There are 6 references.

ASSOCIATION: Institut khimii Ural'skogo filiala Akademii nauk SSSR
(Institute of Chemistry of the Ural Branch of the Academy of Sciences, USSR)

PRESENTED: March 5, 1959, by B. A. Kazanskiy, Academician
SUBMITTED: April 18, 1959
Card 2/2

83813

S/190/60/002/005/003/015
B004/B067

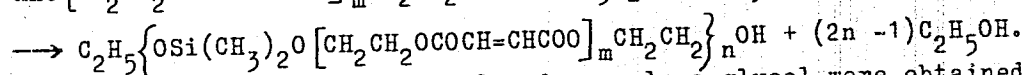
15.8116 also 2209

AUTHORS: Bulatov, M. A., Spasskiy, S. S.

TITLE: Synthesis of Polydimethylsiloxylalkylene Fumarates and Their Copolymerization With Styrene [Abstracter's Note: In the original title alkyl is used instead of alkylene. This is obviously a printing error as appears from the text.]

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 5, pp. 658-661

TEXT: The authors obtained polydimethylsiloxylalkylene fumarates by alcoholysis of dimethyldiethoxysilane with low-molecular glycol polyesters of fumaric acid containing free hydroxyl groups. The reaction proceeded smoothly at 100 - 180°C if the alcohol formed in the reaction was distilled off. The following reaction equation is given for polyethylene fumarate:

$$n\text{HO}[\text{CH}_2\text{CH}_2\text{OCOCH}=\text{CHCOO}]_m\text{CH}_2\text{CH}_2\text{OH} + n(\text{CH}_3)_2\text{Si}(\text{OC}_2\text{H}_5)_2$$


Polyesters of diethylene glycol and propylene glycol were obtained in the Card 1/3

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Synthesis of Polydimethylsiloxylalkylene
Fumarates and Their Copolymerization With
Styrene

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B004/B067

same manner. If dimethyl-di-n-butoxysilane is used instead of dimethyl-diethoxysilane, the reaction proceeds very slowly and incompletely. The compounds obtained are viscous liquids insoluble in water and aliphatic hydrocarbons, but soluble in alcohol, acetone, esters, aromatic hydrocarbons, dichloroethane, and chloroform. On contact with water or on storing in humid air, hydrolysis slowly sets in. The molecular weight fluctuated between 1,600 and 2,500. The physical data of the compounds obtained are given in Table 1. In the presence of peroxides these polyesters are capable of copolymerizing with many unsaturated compounds. Ethylene glycol polyester absorbed 30 - 70% styrene. The solubility of the latter increased when the polyester contained an increasing amount of siloxane groups. Table 2 gives the data used for calculating the copolymerization constants according to F. R. Mayo and F. M. Lewis (Ref. 8): $r_1 = 0.6 \pm 0.3$; $r_2 = 0.03 \pm 0.03$; index 1 refers to the polyester, index 2 to styrene. The introduction of organosiloxane groups into the chain of the unsaturated polyester does not influence the character of copolymerization with vinyl polymers. There are 2 tables and 8 references:

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Synthesis of Polydimethylsiloxymethylene
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Styrene

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B004/B067

7 Soviet and 1 US.

ASSOCIATION: Institut khimii Ural'skogo filiala AN SSSR
(Institute of Chemistry of the Ural Branch of the
AS USSR)

SUBMITTED: January 3, 1960

Card 3/3

83700

S/190/60/002/006/005/012
B015/B064

158114 also 2209

AUTHORS: Mat'kova, M. Ye., Spasskiy, S. S.

TITLE: Copolymerization of Polyethylene Glycol Fumarate Phosphinate With Allyl Derivatives of Phosphoric Acids

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 6, pp. 879-883

TEXT: This is the VIII. information of the series on the copolymerization of unsaturated polyesters with vinyl- and allyl monomers. The copolymerization of the allyl derivatives of phosphoric acid with mixed ethylene glycol polyesters of fumaric- and phosphinic acid was investigated. To determine the relative activity of these compounds in the copolymerization the copolymerization constants were determined of the following systems: polyethylene glycol fumarate phenyl phosphinate - allyl diethyl phosphineacetate and polyethylene glycol fumarate phenyl phosphinate - diethylallyl phosphinic acid and the values $r_1 = 1.73 \pm 0.3$ and $r_2 = 0.015 \pm 0.06$, and $r_1 = 2.07 \pm 1.12$ and $r_2 = 0.09 \pm 0.05$ respectively were

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Copolymerization of Polyethylene Glycol Fumarate S/190/60/002/006/005/012
Phosphinate With Allyl Derivatives of Phosphoric B015/B064
Acids

obtained (Table). A comparison of the copolymerization constants shows that the activity of the allyl derivatives increases with respect to the polyester radicals if the first are copolymerized with mixed polyesters. The increase in the activity of the allyl derivatives of phosphoric acids in the copolymerization with polyfumarate phosphinates is apparently due to the presence of the P=O group in the mixed polyesters. The method of producing the mixed ester and the determination of the copolymerization constants is described. Phosphorus is determined in copolymers by the method of Neyman (Ref. 4), while the diagrams (Fig. 3) of the integral composition of the copolymers were determined by the equation of L. M. Gindin, A. D. Abkin, and S. S. Medvedev (Ref. 7). There are 3 figures, 1 table, and 8 references: 7 Soviet and 1 US.

ASSOCIATION: Institut khimii Ural'skogo filiala AN SSSR (Institute of
Chemistry of the Ural Branch of the Academy of Sciences
USSR)

SUBMITTED: February 18, 1960

Card 2/2

83471

S/190/60/002/009/001/019
B004/B060

15.8000 also 2109, 2209

AUTHORS: Spasskiy, S. S., Mat'kova, M. Ye., Tokarev, A. V.

TITLE: Copolymerization of Unsaturated Polyesters With Vinyl Monomers. VI. Thermomechanical Analysis of the Copolymers of Unsaturated Polyesters and Vinyl Monomers

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 9, pp. 1297-1300

TEXT: In previous articles (Refs. 1, 2), the authors studied the copolymerization of the polyesters (M_1) polydiethylene glycol fumarate and poly-1,3-butylene glycol fumarate with the vinyl monomers (M_2) styrene, vinyl acetate, acrylonitrile, and methyl methacrylate, and determined the copolymerization constants given in a table of the present paper. On the basis of these constants, the authors determined the polymer structure by calculating the fraction of M_2-M_2 , $M_1-M_2-M_1-M_2$, or M_1-M_1 bonds. In the present article, the authors describe the thermomechanical

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Polyesters and Vinyl Monomers

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B004/B060

behavior of the copolymers. A method developed by V. A. Kargin et al. (Refs. 3,4) was used for their investigation. Deformation as a function of temperature was measured by means of an apparatus designed by V. L. Tsetlin, V. I. Gavrilov, N. A. Velikovskaya, and V. V. Kochkin (Ref. 5). Respective curves are shown in Fig. 1. The curves observed were of two types. In the first type (copolymers of the two polyesters with vinyl acetate and of poly-1,3-butylene glycol fumarate with styrene in an azeotropic ratio), deformation starts only at the decomposition temperature (between 270 and 290°C; at 240 - 245°C, only in the case of acrylonitrile copolymers). In the second type (copolymers with nonazeotropic ratio of components, copolymers with styrene excess, copolymers of methyl methacrylate), deformation already takes place at a lower temperature; but with further rising temperature the curve forms a plateau (deformation remains constant), until a further deformation occurs at the decomposition temperature. The curves of the first type are characteristic of $M_1-M_1-M_1$ and $M_1-M_2-M_1-M_2$ bonds, while the curves of the second type are

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Copolymerization of Unsaturated Polyesters
With Vinyl Monomers. VI. Thermomechanical
Analysis of the Copolymers of Unsaturated
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B004/B060

characteristic of linear structures with $M_2-M_2-M_2$ bonds. These results confirm the structures calculated from the copolymerization constants. The authors thank G. L. Slonimskiy for his introduction into the method of thermomechanical analysis. There are 1 figure, 1 table, and 6 Soviet references.

ASSOCIATION: Institut khimii Ural'skogo filiala AN SSSR (Institute of Chemistry of the Ural Branch AS USSR)

SUBMITTED: November 25, 1959

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Card 3/3

83473

S/190/60/002/009/004/019
B004/B060

15.8000 also 2109, 2209

AUTHORS: Spasskiy, S. S., Molchanova, T. V.

TITLE: Copolymerization of Unsaturated Polyesters With Vinyl Monomers. X. Thermomechanical Study of Copolymers of Three-component Systems

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 9, pp. 1320-1323

TEXT: The authors utilized the apparatus designed by V. L. Tsetlin, V. I. Gavrilov, et al. (Ref. 12) (method by V. A. Kargin et al., Ref. 11) to study the thermomechanical behavior of copolymers of polydiethylene glycol fumarate + styrene + vinyl acetate (I) and polydiethylene glycol fumarate + methyl methacrylate + styrene (II) under a stress of 40 kg/cm². The copolymerization constants are given in Table 1, and the physical data regarding vinyl monomers in Table 2. In a previous paper (Ref. 5) on two-component systems, the authors established two types of thermomechanical curves. In the first type, corresponding to cross-linked copolymers, deformation starts only at decomposition temperature.

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Copolymerization of Unsaturated Polyesters
With Vinyl Monomers. X. Thermomechanical
Study of Copolymers of Three-component Systems

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B004/B060

The second type characterizes linear structures, and deformation occurs already at a low temperature, remains constant on a temperature rise, and further increases at decomposition temperature. Fig. 1 shows the diagrams of the composition of I and II. In spite of different primary ratio of the three components, the composition of the forming copolymer tends toward the azeotropic composition. The thermomechanical properties of I and II are graphically represented in Fig. 2. In azeotropic I the deformation curve forms no plateau, while plateaux appear in nonazeotropic I, since linear structures are formed after saturation of the active bonds of the polyester. In II, the deformation curve features a plateau. These results fit those obtained on the strength of the copolymerization constants. In opposition to other researchers (Refs. 9,10), the authors found that the constants of copolymerization of low-molecular diesters of fumaric acid with vinyl monomers are not applicable to the calculation of the copolymer composition (Fig. 3). There are 3 figures, 2 tables, and 12 references: 8 Soviet, 2 US, and 2 British.

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Copolymerization of Unsaturated Polyesters
With Vinyl Monomers. X. Thermomechanical
Study of Copolymers of Three-component Systems

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B004/B060

ASSOCIATION: Ural'skiy filial AN SSSR, Institut khimii (Ural Branch of
the AS USSR, Institute of Chemistry)

SUBMITTED: February 8, 1960

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15.8340

2209, 2109, 2808

87338

S/190/60/002/010/021/026/XX
B004/B064

AUTHORS: Spasskiy, S. S., Molchanova, T. V.

TITLE: Copolymerization of Unsaturated Polyesters With Vinyl- and Allyl Monomers. XI. Copolymerization of Polydiethylene Glycol Fumarate Adipate and of Low-molecular Polydiethylene Glycol Fumarate With Styrene

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 10, pp. 1481-1485

TEXT: In previous papers (Refs. 1-6) the authors reported on the copolymerization of polyglycol fumarates. Copolymers of this kind are used for glass reinforced plastics. Since, however, no pure compounds are used in the practice, this paper discusses the effect of an addition of saturated acids to the unsaturated polyester upon the molecular weight and the copolymerization constants. The copolymerization with styrene of polydiethylene glycol fumarate-adipate (I), molecular weight 1610, and of two samples of polydiethylene glycol fumarate (II), molecular weight 510 and 1970 was investigated. The reaction took place in sealed glass ampouls

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Copolymerization of Unsaturated Polyesters
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merization of Polydiethylene Glycol Fumarate Adipate and of Low-
molecular Polydiethylene Glycol Fumarate With Styrene

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B004/B064

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in nitrogen atmosphere at 60°C. Benzoyl peroxide served as initiator. After the non-polymerized products had been removed by washing with acetone (5 - 6 days), the composition was determined on the basis of the oxygen content in the copolymer. The number of polyester links entered into reaction was determined on the basis of the additivity of the specific volumes and the known shrinkage in polymerization. The following results were obtained: 1) The copolymerization constants for I and II with styrene differ little. 2) The styrene activity increases with decreasing molecular weight of the polyester. It reaches its maximum in the reaction with diethyl fumarate. 3) Since due to the changed styrene activity also its content in the copolymer changes, this fact must be taken into account in the production of binding agents for glass reinforced plastics. There are 1 figure, 2 tables, and 9 references: 6 Soviet, 2 US, and 1 German.

ASSOCIATION: Ural'skiy filial AN SSSR, Institut khimii (Ural Branch of the AS USSR, Institute of Chemistry)

SUBMITTED: April 18, 1960

Card 2/2

8/190/60/002/011/001/027
B004/B060

11.2210 also 2209
AUTHORS: Tarasov, A. I., Tskhay, V. A., Spasskiy, S. S.

TITLE: A Study of Equations for the Composition of Ternary Copolymers. I

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 11, pp. 1601 - 1607

TEXT: The authors wanted to find simple and practical ways of determining an azeotropic composition of copolymers. For this purpose they analyzed the equations relating to such compositions as possess a single azeotropic point. The following relations are derived for it: $m_1/m_3 = M_1^i/M_3^i$ and $m_2/m_3 = M_2^i/M_3^i$, where m_1, m_2, m_3 are the percentual concentrations, and M_1^i, M_2^i, M_3^i the molar concentrations of the components. Taking into account the relative rate constants $r_{12}, r_{21}, r_{13}, r_{31}, r_{23}$, and r_{32} , the following system of equations is obtained for the azeotropic point:

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A Study of Equations for the Composition of Ternary Copolymers. I

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$$\left(\frac{M'_1}{r_{31}r_{21}} + \frac{M'_2}{r_{21}r_{32}} + \frac{M'_3}{r_{31}r_{23}} \right) \left(M'_1 + \frac{M'_2}{r_{12}} + \frac{M'_3}{r_{13}} \right) = 1 \quad (3a)$$

$$\left(\frac{M'_1}{r_{12}r_{31}} + \frac{M'_2}{r_{12}r_{32}} + \frac{M'_3}{r_{32}r_{13}} \right) \left(M'_2 + \frac{M'_1}{r_{21}} + \frac{M'_3}{r_{23}} \right) = 1 \quad (3b)$$

$$\left(\frac{M'_1}{r_{13}r_{31}} + \frac{M'_2}{r_{23}r_{12}} + \frac{M'_3}{r_{13}r_{23}} \right) \left(M'_3 + \frac{M'_1}{r_{31}} + \frac{M'_2}{r_{32}} \right) = 1 \quad (3c)$$

$$M'_1 + M'_2 + M'_3 = 1.$$

One unknown quantity is suppressed by introducing $M_1 = M'_1/M'_3$ and $M_2 = M'_2/M'_3$.

Moreover, in order to avoid fractions, the reciprocal values of the relative rate constants are introduced:

$$A_{12} = 1/r_{12}, A_{21} = 1/r_{21},$$

etc., and the system of equations (7) is obtained:

$$AM_1^2 + 2BM_1M_2 + CM_2^2 + 2DM_1^2 + 2EM_2 + F = 0; A_1M_1^2 + 2B_1M_1M_2 + C_1M_2^2 + 2D_1M_1 + 2E_1M_2 + F_1 = 0. \text{ The coefficients of these equations are defined as: } A = A_{21}A_{31}A_{11};$$

$$2B = A_{21}A_{32}A_{11} + A_{12}A_{31}A_{12}; C = A_{12}A_{32}A_{12}; 2D = A_{23}A_{31}A_{11} + A_{21}A_{13}A_{13};$$

$$2E = A_{12}A_{23}A_{13} + A_{13}A_{32}A_{12}; F = A_{13}A_{23}A_{13}; A_1 = A_{21}A_{31}A_{11}; 2B_1 = A_{21}A_{32}A_{11};$$

$$+ A_{12}A_{31}A_{12}; C_1 = A_{12}A_{32}A_{12}; 2D_1 = A_{23}A_{31}A_{11} + A_{21}A_{13}A_{13}; 2E_1 = A_{12}A_{23}A_{13} + A_{13}A_{32}A_{12};$$

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A Study of Equations for the Composition of Ternary Copolymers. I

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$F = A_{13}A_{23}^{1/2}$; $l_1 = 1 - A_{13}$; $l_2 = A_{21} - A_{23}$; $l_3 = A_{31} - 1$; $l_1' = A_{12} - A_{13}$; $l_2' = 1 - A_{23}$; $l_3' = A_{32} - 1$. The authors derived the criteria under which only positive values are obtained for equations (7). It is confirmed that only one single azeotropic point can be present in the ternary system. The following systems with azeotropic composition are tabulated:

System	Copolymerization constants						Azeotropic composition in molar fractions
	r_{12}	r_{21}	r_{13}	r_{31}	r_{23}	r_{32}	
styrene with vinylidene dichloride η	2.0	0.14	0.3		12.2		0.529
and dimethyl fumarate				0.07		0.046	0.093
methyl methacrylate η	0.44		1.35				0.378
with 2,5-dichloro styrene		2.25			0.07		0.139
and acrylonitrile η				0.18		0.22	0.387
styrene with 2,5-dichloro styrene	0.29		0.41				0.474
and acrylonitrile		2.2			0.07		0.467
				0.04		0.22	0.153
							0.380

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A Study of Equations for the Composition of
Ternary Copolymers. I

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B004/B060

There are 1 figure, 1 table, and 6 references: 2 Soviet and 4 US.

ASSOCIATION: Institut khimii Ural'skogo filiala AN SSSR (Institute of
Chemistry of the Ural Branch of AS USSR)

SUBMITTED: January 29, 1960

Card 4/4

S/190/60/002/011/009/027
B004/B060

AUTHORS: Alekseyeva, I. A., Spasskiy, S. S.

TITLE: Copolymerization of Unsaturated Polyesters With Vinyl- and Allyl Monomers. XII. Study of Copolymers of Polydiethylene Glycol Fumarate and Styrene by Infrared Spectroscopy and the Chemical Method 21

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 11, pp. 1645 - 1654

TEXT: The authors report on a new method of determining double bonds in copolymers of unsaturated polyesters. The method is based on the determination of the ratio between the optical density of the bands of the groups whose content has changed due to copolymerization, on the one hand, and the optical density of the bands of the groups whose content has remained unchanged, on the other. The method is thus independent of the thickness of the irradiated sample. The copolymerization of polydiethylene glycol fumarate (PDEGF) with styrene was studied. The infrared spectrum (Fig. 1a, b) revealed that in the copolymer the optical density of the

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Copolymerization of Unsaturated Polyesters With Vinyl- and Allyl Monomers. XII. Study of Copolymers of Polydiethylene Glycol Fumarate and Styrene by Infrared Spectroscopy and the Chemical Method

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1654 cm^{-1} absorption band of the $-\text{CH}=\text{CH}$ group has changed as against the spectrum of PDEGF. The 705 cm^{-1} band of the benzene ring was also identified. The calculation of nonreacting double bonds by various methods yielded the following values:

Table 2

Method	Number of nonreacting double bonds of the polyester converted into copolymer, %
Change in the optical density of the band for double bond	45 \pm 2
Content of unsaturated acids in the sulfuric hydrolyzate	47 \pm 2
Yield of polymer separated from the sulfuric hydrolyzate	59 \pm 5
Change in the specific volume	58 \pm 5

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Copolymerization of Unsaturated Polyesters S/190/60/002/011/009/027
With Vinyl- and Allyl Monomers. XII. Study B004/B060
of Copolymers of Polydiethylene Glycol Fumarate and Styrene by Infrared
Spectroscopy and the Chemical Method

The last two data are said to be little probable, as their determination error is too large. The styrene content in the copolymer was found to be 14.5% by means of infrared spectroscopy (an MKC-12 (IKS-12) recording spectrophotometer was used). Elementary microanalysis yielded 13%, and the oxygen content determination 12%. The number of double bonds was determined by the chemical method of I. I. Ioffe (Ref. 12): hydrolysis by means of concentrated H_2SO_4 , after two days addition of 0.1 N $KMnO_4$ and KI, and titration of free fumaric acid with 0.1 N thiosulfate. Ioffe's calculations had to be corrected, however, because diethylene glycol also uses up some $KMnO_4$ (0.01 g diethylene glycol = 0.39 ml thiosulfate). On dilution of the hydrolyzed copolymer some polymer was precipitated, the infrared spectrum of which was likewise taken (Fig. 1c), and which was compared with a standard mixture of 56% dimethyl malonate and 44% ethyl benzene (Fig. 1d). Based on the spectroscopic analysis, the styrene content of this polymer was 35%, in agreement with the chemical analysis. In this product, 1.7 fumaric acid molecules fall to one styrene molecule.

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Copolymerization of Unsaturated Polyesters S/190/60/002/011/009/027
With Vinyl- and Allyl Monomers. XII. Study of B004/B060
Copolymers of Polydiethylene Glycol Fumarate and Styrene by Infrared
Spectroscopy and the Chemical Method

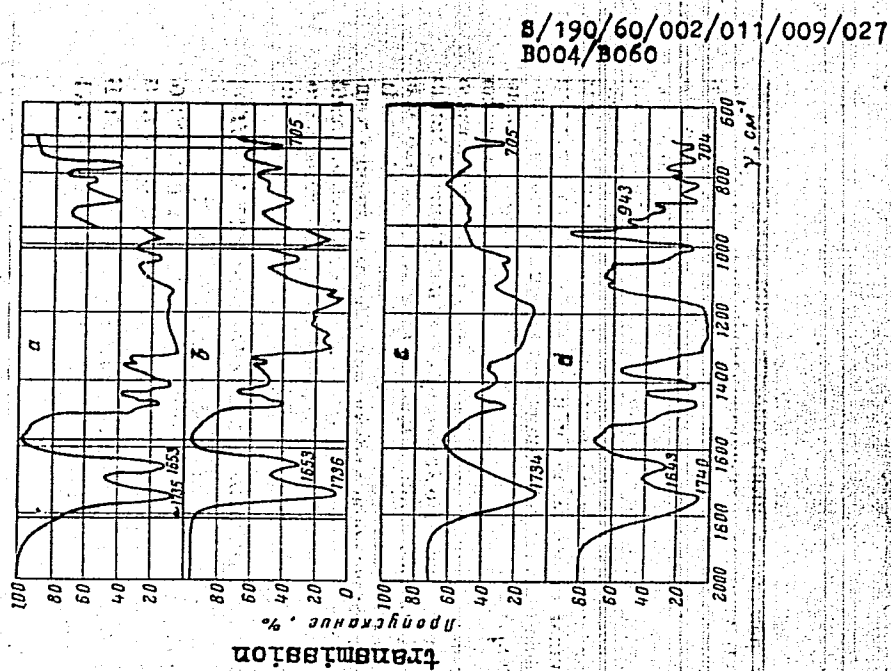
According to this, the fumaric groups of PDEGF react not only with
styrene but also among one another. The suggested spectroscopic method
gave more accurate results than methods used before. The authors thank
T. V. Molchanova and G. A. Semerнева for their assistance in the analyses.
There are 2 figures, 4 tables, and 12 references: 7 Soviet, 2 US,
1 British, and 2 German.

ASSOCIATION: Institut khimii Ural'skogo filiala AN SSSR (Institute of
Chemistry of the Ural Branch of AS USSR)

SUBMITTED: May 3, 1960

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Card 5/6



S/190/60/002/011/009/027
B004/B060

(Legend to) Fig. 1 Infrared spectra of

- a) polydiethylene glycol fumarate, b) copolymer from polydiethylene glycol fumarate and styrene, c) copolymer product of sulfuric acid hydrolysis, d) mixture of 56% dimethyl maleate and 44% ethyl benzene

Card 6/6

5.3830

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SOV/79-30-1-56/78

AUTHORS:

Spasskiy, S. S., Tokarev, A. V., Mikhaylova, M. A.,
Moichanova, T. V., Mat'kova, M. Ye.

TITLE:

Copolymerization of Unsaturated Polyesters With Vinyl
Monomers. III Concerning the Nature of Copolymeriza-
tion of Unsaturated Polyesters With Vinyl Monomers

PERIODICAL:

Zhurnal obshchey khimii, 1960, Vol 30, Nr 1, pp 250-257
(USSR)

ABSTRACT:

Copolymers of poly(1,3-butylene glycol fumarate) with
vinylcarbazole, acrylonitrile, vinyl acetate, methyl
methacrylate, and poly(ethylene glycol fumarate) with
vinyl acetate were prepared in order to study the
nature of this copolymerization. Literature data
concerning the copolymerization constants of different
copolymers are reviewed. Copolymerization of polyesters
with acrylonitrile, vinyl acetate, and methyl meth-
acrylate was conducted in sealed glass ampoules in a

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Copolymerization of Unsaturated Polyesters
With Vinyl Monomers. III.

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nitrogen atmosphere. The ampoules were placed in a thermostat at $60 \pm 0.1^\circ$. Benzoyl peroxide was used as an initiator. After completion of the reaction (to the given extent), the ampoules were removed from the thermostat and frozen with liquid nitrogen. The trimeric copolymer was separated from other products of reaction and the initial products by treatment with acetone containing traces of hydroquinone, and washing with acetone. Copolymerization of poly(1,3-butylene glycol fumarate) with vinylcarbazole was conducted in toluene solution (in nitrogen atmosphere) in the presence of benzoyl peroxide (up to 1%). The mixture was heated for 65 hr at 100° , but no copolymers were obtained. From the data obtained, the following conclusions were made: activity of acrylonitrile in the reactions with polyesters is low in comparison with its activity in the reactions with diesters of fumaric acid. Copolymerization of vinylcarbazole with polyesters does not take place at all. Apparently, the bulky substituents cause steric hindrance affecting

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Copolymerization of Unsaturated Polyesters
With Vinyl Monomers. III

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the copolymerization process. The activity of vinyl acetate in the copolymerization remains unchanged. Copolymerization constants of the following copolymers were determined:

	r_1	r_2
Poly(1,3-butylene glycol fumarate) - acrylonitrile	1.12 ± 0.040	1.03 ± 0.2
Poly(1,3-butylene glycol fumarate) - methyl methacrylate	0.5 ± 0.5	2.1 ± 0.30
Poly(1,3-butylene glycol fumarate) - vinyl acetate	0.2 ± 0.2	0.15 ± 0.07
Poly(ethylene glycol fumarate) - vinyl acetate	0.2 ± 0.1	0.020 ± 0.02

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With Vinyl Monomers. III

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There are 4 tables; 2 figures; and 16 references, 2 U.S., 5 U.K., 9 Soviet. The 5 most recent U.S. and U.K. references are: B. Hayes, R. Hunter, Chem. and Ind., 1957, 559; V. Wycherly, Chem. and Ind., 1957, 491; W. Robertson, D. Shepherd, Chem. and Ind., 1958, 126; B. Hayes, W. Read, L. Vaygan, Chem. and Ind., 1162 (1957); F. Leavitt, V. Stannett, M. Szwarc, Chem. and Ind., 28, 985 (1957).

ASSOCIATION: Ural Branch of the Institute of Chemistry, Academy of Sciences, USSR (Uralskiy filial AN SSSR, Institut khimii)

SUBMITTED: July 29, 1958

Card 4/4

5.3830

77396

SOV/79-30-1-57/78

AUTHORS: Spasskiy, S. S., Tarasov, A. I.

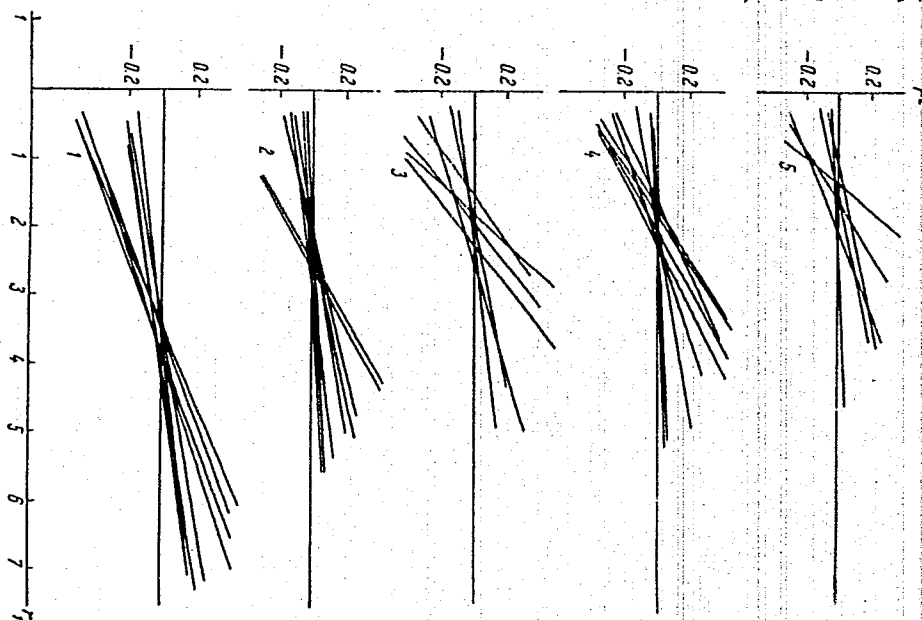
TITLE: Copolymerization of Unsaturated Polyesters With Vinyl Monomers. V. Copolymerization of Poly(1,3-Butylene Glycol Fumarate) With Vinyl Alkyl Ethers

PERIODICAL: Zhurnal obshchey khimii, 1960, Vol 30, Nr 1, pp 257-263 (USSR)

ABSTRACT: Effect of the structure of vinyl ethers on their activity in the copolymerization with unsaturated polyesters was studied. Copolymerization of poly(1,3-butylene glycol fumarate) with vinyl isoamyl, vinyl n-amyl, vinyl isobutyl, vinyl n-butyl, and vinyl n-propyl ethers was conducted according to the procedure described in the previous work (Spasskiy and others, ZhOKh, 30, 250, 1960). Copolymerization constants (see Fig. 1), data concerning the composition, and mechanical properties of the copolymers obtained are given. The following conclusions are made: about 60% of the double bonds of the polyester remain

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Copolymerization of Unsaturated Polyesters
With Vinyl Monomers. V. Copolymerization of
Poly(1,3-Butylene Glycol Fumarate) With Vinyl
Alkyl Ethers

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Fig. 1. Graphical determination of copolymerization constants of poly(1,3-butylene glycol fumarate) and vinyl alkyl ethers. (1) Vinyl isoamyl ether ($r_1 = 3.8 \pm 0.7$; $r_2 = 0$); (2) vinyl n-amyl ether ($r_1 = 2.7 \pm 0.7$; $r_2 = 0$); (3) vinyl isobutyl ether ($r_1 = 2.0 \pm 0.7$; $r_2 = 0$); (4) vinyl n-butyl ether ($r_1 = 1.8 \pm 0.5$; $r_2 = 0$); (5) vinyl n-propyl ether ($r_1 = 1.6 \pm 0.5$; $r_2 = 0$).

Caption for Fig. 1.

unchanged at 15-20% conversion; the activity of the vinyl ethers (in respect to the fumarate unit) does not depend on their structure; uniform (in respect to composition) copolymer is formed when the ratio

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Copolymerization of Unsaturated Polyesters
With Vinyl Monomers. V. Copolymerization of
Poly(1,3-Butylene Glycol Fumarate) With Vinyl
Alkyl Ethers

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polymer: vinyl ether is not less than 9:1; the thermo-
mechanical investigations of the copolymers obtained
show that the quoted copolymerization constants are
correct (see Figs. 4, 5, and 6). There are 4 tables;
6 figures; and 16 references, 5 U.S., 11 Soviet. The
U.S. references are: F. M. Lewis, C. Walling, W.
Cummings, E. R. Briggs, F. R. Majo, J. Am. Chem. Soc.,
70, 1519 (1948); F. M. Lewis, C. Walling, W. Cummings,
E. R. Briggs, W. J. Wenisch, J. Am. Chem. Soc., 70,
1527 (1948); F. M. Lewis, F. R. Majo, J. Am. Chem.
Soc., 70, 1533 (1948); F. R. Majo, C. Walling, F. M.
Lewis, J. Am. Chem. Soc., 70, 1523 (1948); E. C.
Chapin, E. G. Hain, C. K. Mills, J. Polymer Sci., 4,
597 (1949).

ASSOCIATION: Ural Branch of the Institute of Chemistry, Academy
of Sciences, USSR (Uralskiy filial AN SSSR, Institut
khimii)

SUBMITTED: July 30, 1958

Card 4/7

Copolymerization of Unsaturated Polyesters
With Vinyl Monomers. V. Copolymerization of
Poly(1,3-Butylene Glycol Fumarate) With Vinyl
Alkyl Ethers

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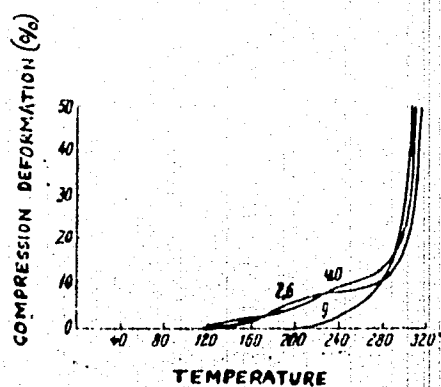


Fig. 4. Thermomechanical curves of copolymers of poly-(1,3-butylene glycol fumarate) and vinyl n-butyl ether. The figures on the curves are the moles of polymers for 1 mole of vinyl ether.

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Copolymerization of Unsaturated Polyesters
With Vinyl Monomers. V. Copolymerization of
Poly(1,3-Butylene Glycol Fumarate) With Vinyl
Alkyl Ethers

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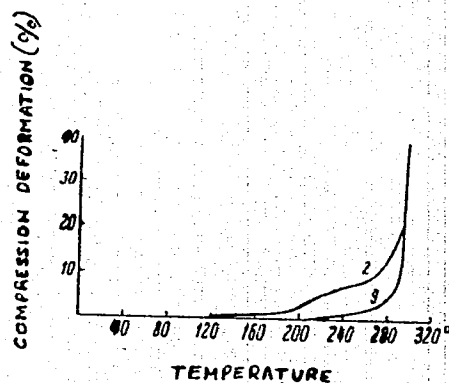


Fig. 5. Thermomechanical curves of copolymers of poly-(1,3-butylene glycol fumarate) and vinyl isoamyl ether.

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Copolymerization of Unsaturated Polyesters
With Vinyl Monomers. V. Copolymerization of
Poly(1,3-Butylene Glycol Fumarate) With Vinyl
Alkyl Ethers

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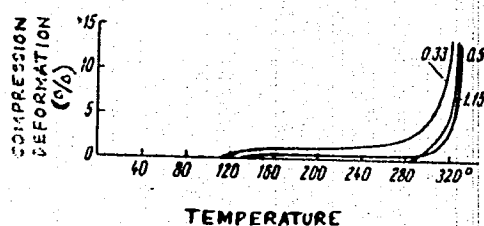


Fig. 6. Thermomechanical curves of copolymers of
poly(1,3-butylene glycol fumarate) and styrene.

Card 7/7

SPASSKIY, S. S., Doc. CHEM SCI, "COPOLYMERIZATION OF *unsaturated*
HETEROC~~YCLIC~~ ^{*hain*} POLYESTERS WITH VINYL AND ALLYL MONOMERS."
^{*Report*} A PAPER ON PUBLISHED WORKS, PRESENTED ^{*for*} DEFENSE OF ^{*academic*} ~~AN~~-
VER~~SE~~ DEGREE OF DOCTOR OF CHEM~~ICAL~~ SCIENCES. SVERDLOVSK,
1961. (ACAD SCI USSR. URAL AFFILIATE. INST OF CHEM.).
(KL-DV, 11-61, 210).

TARASOV, A.I.; TSKHAY, V.A.; SPASSKIY, S.S.

Composition equations for three-component copolymers. Part 2.
Vysokom. soed. 3 no.1:14-20 Ja '61. (MIA 14:2)

1. Institut khimii Ural'skogo filiala AN SSSR.
(Polymers)

88730

S/190/61/003/001/014/020
B119/B216

15-8114

AUTHORS:

Mat'kova, M. Ye., Spasskiy, S. S.

TITLE:

Copolymerization of poly-1,3-butylene-glycol fumarate and diethyl allyl phosphinic acid

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 1, 1961, 93-98

TEXT: The present work studies the activity of each reaction component in copolymerization of the compounds mentioned in the title. Poly-1,3-butylene-glycol fumarate (A) was prepared by polycondensation of equimolar amounts of maleic anhydride and 1,3-butylene glycol. Allyl phosphonic acid diethyl ester (B) was obtained by A. Ye. Arbuzov's rearrangement reaction (Ref. 10) from equimolar amounts of triethyl phosphite and allyl bromide. A and B mixed in various proportions were copolymerized in nitrogen-filled sealed ampoules at 80°C. The copolymers obtained were analyzed as follows: Pycnometric density determination on powdered product, analysis for P, hydrolysis of copolymer by concentrated H_2SO_4 ; The specific contraction of the monomeric unit of A was found at 0.0971 by comparing the specific

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Copolymerization of poly-1,3-butylene...

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volume of the copolymerizate obtained from A and B with that of the copolymerizate of diethyl fumarate and styrene (in accordance with the rule of additivity of specific volumes (Ref. 6)). The specific volume of the polymer B was determined graphically at 0.8700 basing on the additivity of the specific volumes of the copolymer of B with vinyl acetate. Thermomechanical tests of the copolymer from A and B were carried out in equipment designed by V. L. Tseytlin, V. I. Gavrilov, I. A. Velikovskaya and V. V. Kochkin. Copolymerization constants were calculated by means of the integral equation by R. Mayo and M. Lewis (Ref. 2). Corrections are made for unreacted double bonds of the polyester. Results: The polymerization constants of the system A - B are $r_1 = 9.25 \pm 3.00$; $r_2 = 0.12 \pm 0.008$. B exhibits a lower activity in copolymerization with unsaturated polyesters than the fumaric double bonds of the polyester. The three-dimensional structure of the copolymer is formed not only as a result of interaction of polyester double bonds with the monomer, but also by the mutual interaction of these double bonds. (Approximately 80% of the existing double bonds react during copolymerization, but only 40% of this amount reacts with B). Copolymers of close to azeotropic ratio of components exhibited the best mechanical and

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Copolymerization of poly-1,3-butylene...

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B119/B216

dielectric properties. They are flame-resistant and suitable as filler for reinforced plastics. Mention is made of a publication by L. M. Gindin, A. D. Abkin, and S. S. Medvedev. There are 4 figures, 2 tables, and 12 references: 10 Soviet-bloc and 3 non-Soviet-bloc.

ASSOCIATION: Institut khimii Ural'skogo filiala AN SSSR (Institute of Chemistry of the Ural Branch of the AS USSR)

SUBMITTED: June 8, 1960

Card 3/3

15-8116

89587
S/190/61/003/002/005/012
B130/B202

AUTHORS: Bulatov, M. A., Spasskiy, S. S.

TITLE: Thermomechanical study of the copolymers of polydiphenyl siloxyethylene fumarate with styrene

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 2, 1961, 208-212

TEXT: Two new organosilicon, unsaturated polyesters were synthesized by the method for the production of unsaturated silicon containing polyesters from dimethyl diethoxysilane with low-molecular glycol ester of fumaric acid which the authors described in Vysokomolek. soyed. 2, 658, 1960. These polyesters contain two ethyl or phenyl radicals at each Si-atom. Polydiethyl siloxyethylene fumarate (I) was produced from low-molecular polyethylene glycol fumarate (II) (12% OH groups) and diethyl diethoxysilane (III) by a 22-hr heating in nitrogen current at temperatures rising from 165 to 225°C. The ethyl alcohol with silane additions volatilized. The substances which did not enter the reaction were distilled off at atmospheric pressure and subsequently in the vacuum. The residue was a transparent product of red-orange color. The following structural formula can be calculated from

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B130/B202

Thermomechanical study of ...

the C, H, Si content: $[(C_2H_4 - OCOCH = CHCOO)_6 \cdot C_2H_4OSi(C_2H_5)_2O]_x$. Polydiphenyl siloxyethylene fumarate was produced like (I) from (II) and diphenyl diethoxysilane under heating to 200°C for four hr. Copolymers from (III) and styrene were studied thermomechanically according to the method by V. A. Kargin, Zh. fiz. khimii, 23, 530, 1949, and Khim. prom-st', 1955, no. 3 64. Cylindrical specimens with a diameter of 9 mm and a thickness of 3.2-3.5 mm were formed from the copolymers. They were studied under specific load of 8 and 40 kg/cm². The deformation curves are similar to those of the highly elastic substances. The introduction of bifunctional diorganosiloxane chains into the chain of the unsaturated polyesters causes a highly elastic deformation in the copolymers. With a composition similar to the azeotropic one, minimum deformation occurs. The constants of copolymerization of the unsaturated polyesters containing diorganosiloxane chains only slightly depend on the character of the hydrocarbon radicals at the Si-atom. There are 3 figures, 1 table, and 7 Soviet-bloc references.

ASSOCIATION: Institut Khimii Ural'skogo Filiala AN SSSR (Institute of Chemistry of the Ural Branch, AS USSR)

SUBMITTED: June 15, 1960

Card 2/2

53830 2209.1372, 1234

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21129
S/190/61/003/004/002/014
B101/B207

AUTHORS: Spasskiy, S. S., Karas', L. Ya.

TITLE: Problem of a quantitative characteristic of the activity of unsaturated compounds in copolymerization reactions

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 4, 1961, 505-514

TEXT: The authors proceed from the papers of T. Alfrey, C. Price (Ref. 1, see below) in which the copolymerization of unsaturated compounds was characterized by two constants, the activity factor Q and polarity factor e ; e denotes the electron density of the double bond. According to these researchers, the following equations hold for the copolymerization constants r_1, r_2 : $r_1 = (Q_1/Q_2) \exp[-e_1(e_1 - e_2)]$ (1) and $r_2 = (Q_2/Q_1) \exp[-e_2(e_2 - e_1)]$ (2). The correction made by L. Wall (Ref. 2, see below) is mentioned, by which the polarity factors e_1^* and e_2^* were added, thus considering charge of radicals with unpaired electrons. It was the aim of the present study to express the activity factors by a constant which may be determined independently of the equations (1) and (2). As such the π bond share of the

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Problem of ...

molecular refraction was chosen, since reactivity increases with increasing polarizability of the π bonds. Q is replaced by the product $\alpha\beta$. α expresses the polarizability of the π bonds characterized by refraction, β , the effects of the monomer structure not considered by α . For the polar factor of the monomer Σ is introduced, for that of the radical, the authors use Σ^* and write down the following equations:

$$r_1 = (\alpha_1\beta_1/\alpha_2\beta_2) \exp[-\Sigma_1^*(\Sigma_1 - \Sigma_2)] \quad (5) \text{ and}$$

$$r_2 = (\alpha_2\beta_2/\alpha_1\beta_1) \exp[-\Sigma_2^*(\Sigma_2 - \Sigma_1)] \quad (6).$$

In consideration of the factor $\Delta\Sigma^*$ of the excess radical charge due to the unpaired electron, and the number n_1 , and n_2 of the conjugate double bonds the following is obtained:

$$r_1 = (\alpha_1\beta_1/\alpha_2\beta_2) \exp[-(\Sigma_1 + \Delta\Sigma^*/n_1)(\Sigma_1 - \Sigma_2)] \quad (9) \text{ and}$$

$$r_2 = (\alpha_2\beta_2/\alpha_1\beta_1) \exp[-(\Sigma_2 + \Delta\Sigma^*/n_2)(\Sigma_2 - \Sigma_1)] \quad (10).$$

Table 2 lists the results of the calculation of these factors. It was possible to differentiate between three groups of monomers. 1) $\beta \sim 1$ holds for the monosubstituted ethylene derivatives the double bond of which is conjugated with aromatic or carbonyl bond; 2) $\beta > 1$ holds for monosubstituted ethylene derivatives the

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double bond of which is conjugated with ethylene double bond; 3) $\beta < 1$ holds for ethylene derivatives with non-conjugated double bond or for monomers with conjugated double bond, however, with two substituents at the double bond. The low β value is due to steric hindrance. Table 3 compares the product $\alpha\beta$ with the kinetic constant k_{ch} of the chain growth and its

activation energy E_{ch} :

A comparison of the difference between the polarity factor Σ of styrene derivatives and Σ styrene with the Hammett constant σ (σ being taken from the paper by C. Price, Ref. 17, see below) shows good agreement (Table 4). Among 100 systems calculated, in 85 the deviation was less than 10%, in 8 a deviation of 10-15% was

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Monomer	$\alpha \cdot \beta$	$(k_{ch})_{60}$	E_{ch} , kcal/mole
vinyl acetate	0.23	2040	4.20
vinyl chloride	0.21	12900	3.70
methyl acrylate	3.69	1260	4.70
acrylonitrile	4.25	425	-
methyl methacrylate	4.90	575	4.70
methacrylonitrile	8.04	190	6.00

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Monomer	$\alpha\beta$	$(k_{ch})_{60}$	E_{ch} , kcal/mole
styrene	12.56	178	7.25
butadiene	16.63	105	9.30
isoprene	15.52	50	9.80

observed, and, only in three cases is was >15%. Although the method suggested is only an approximation method, the results obtained are better than those of Alfrey and Price. There are 4 tables and 17 references: 9 Soviet-bloc and 8 non-Soviet-bloc. The 4 references to English-language publications read as follows: T. Alfrey, C. Price, J. Polymer Sci., 2, 101, 1947; L. Wall, J. Polymer Sci., 2, 548, 1947; 5) F. Mayo, F. Lewis, C. Walling, J. Amer. Chem. Soc., 70, 1529, 1948, C. Price, J. Polymer Sci., 3, 178, 1948.

ASSOCIATION: Institut khimii Ural'skogo filiala AN SSSR (Institute of Chemistry of Ural Branch of AS USSR)

SUBMITTED: June 15, 1960

Card 4/11

23767

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B110/B208

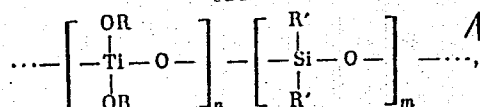
15.3700 7209

AUTHORS: Suvorov, A. L., Spasskiy, S. S.

TITLE: Reaction of butyl orthotitanate with dimethyl diacetoxy silane

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 6, 1961, 865 - 869

TEXT: Polyorganotitanium siloxanes of the formula



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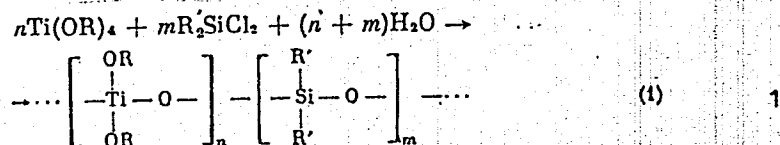
are obtained in the following way by common hydrolysis of the esters of orthotitanic acid and dialkyl dichlorosilanes according to K. A. Andrianov (Ref. 1: Soobshcheniye o nauchnykh rabotakh chlenov VKhO im. Mendeleyeva, 1955, vyp. 3,2; RZhKhim, 1956, 47044):

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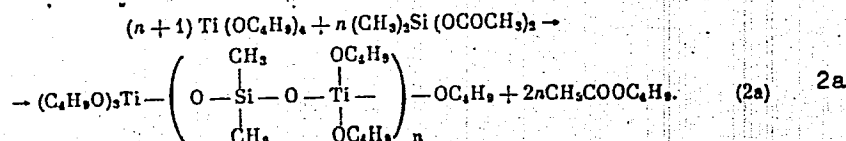
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B110/B208

Reaction of butyl ...



The authors tried to synthesize these compounds by heterofunctional condensation of butyl orthotitanate and dimethyl diacetoxy silane according to



An exothermic reaction was observed already during mixing at room temperature. During heating and distillation dimethyl dibutoxy silane $(\text{CH}_3)_2$

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